June 17, 2005

M E M O R A N D U M

TO: Charles W. Ariss, P.E., Engineering Manager, Boise Regional Office

FROM: Claudia H. Gaeddert, P.E., CLPE
Paul Wakagawa, P.E.

SUBJECT: **Staff Analysis of the Hidden Springs Sewer Company, L.L.C. Wastewater Land Application Permit Renewal, LA-000174-02 (Municipal Wastewater)**

Purpose

The purpose of this memorandum is to satisfy the requirements of IDAPA 58.01.17.400.04 for renewing wastewater land application permits.

Process Description

Hidden Springs Sewer Company, L.L.C. (HSSC) operates a wastewater treatment system and land application site in Ada County, north of Boise in Dry Creek Valley, principally between Cartwright and Seaman's Gulch Roads. Topographically, the site is divided by Dry Creek, a small intermittent stream that crosses the site from the southeast to the northwest. HSSC serves the Hidden Springs Community, L.L.C (Hidden Springs), an approximately 1,800 acre planned rural community including a small commercial center, a school, and residential units. Hidden Springs' highly treated reclaimed wastewater is land applied to agricultural areas, common landscaping areas, and public gathering areas (school grounds, parks, and village greens). Hidden Springs is scheduled to be built in eight phases; currently, Hidden Springs is constructing the 4th Addition (Phase 4).

The Hidden Springs wastewater treatment facility is comprised of a lift station, two aerobic stabilization lagoons, a storage reservoir, and a sand filtration system with disinfection. The stabilization lagoons were constructed, seepage tested, and put into service in 1999.

Domestic raw wastewater is collected and gravity fed by a 12-inch interceptor line discharging to the lift station wet well. Prior to entering the wet well, the wastewater flow is measured and solids are ground or screened from the flow stream. Two (2), 700 gpm submersible pumps pump the raw wastewater to either Cell 1 or Cell 2 of the aerobic lagoons through an 8-inch force main. Emergency power to the lift station is provided by a diesel driven emergency generator. A backflow preventer is installed at the lift station to prevent cross connections between potable water and raw wastewater.

Cell 1 (3,047,520 gallons), Cell 2 (2,321,920 gallons) and the storage reservoir (19,591,200 gallons) are lined with a 60-mil high density polyethylene liner. Normal operation is for flow to be routed from the lift station to the bottom section of Cell 1, with Cell 1 and Cell 2 operating in series. The bottom sections of Cells 1 and 2 are operated in an anaerobic environment. Diffused air, provided by a blower system located in the filtration building, maintains aerobic conditions in the top portions of both treatment cells. The biologically treated effluent is stored in the storage reservoir. The system design average daily flow basis is 145,000 gpd.

A barge pump in the storage reservoir supplies the filtration system with treated effluent. The filtration system has a design average daily flow basis of 864,000 gpd. Turbidity is measured in filter basin clear wells. Downstream of the filtration system, the effluent is chlorinated. An in-line continuous chlorine

analyzer, set to a range of total chlorine levels (generally 1.5 – 2.5 mg/L), controls the chlorinator pump addition rate. As required in LA-000174-01, HSSC performs daily monitoring of the total chlorine residual in the reclaimed wastewater (grab sample near the primary lift station), during periods of reclaimed wastewater reuse.

If either a low chlorine level (in-line analyzer) or high turbidity is measured, an automatic valve located near the primary lift station closes, preventing reclaimed wastewater from entering the irrigation distribution system. If a low chlorine level is measured during daily monitoring of the reclaimed wastewater near the primary lift station, the valve is manually closed. Operators then manually open valves to return wastewater to the treatment system via the lift station. After acceptable wastewater turbidity and chlorine measurements are reestablished, operators manually operate valves to allow the reclaimed wastewater to enter the irrigation distribution system.

The irrigation system for Hidden Springs is operated with either United Water potable water or reclaimed wastewater. Potable water is typically used near the beginning and end of the irrigation season. The wastewater treatment system and land application site are operated by Operations Management Consulting Services, L.L.C. (OMCS) under a contract with HSSC.

HSSC's current permit (LA-000174-01, including Appendix "B" Permit Modification) includes the reclaimed wastewater application areas listed in the table below. Reclaimed wastewater is currently applied to only some of the permitted acreage; additional permitted acres are available for potential future use. HSSC reported in their 2004 annual report that reclaimed wastewater was applied to parts of MU-017401 (Orchard), 1 acre of MU-017406 (community farm), all of MU-017407, and all of MU-017408.

Serial #	Hydraulic Management Unit (HMU) Description	Type of Use	Acres
MU-017401 (SU-017401)	Orchard along Seaman's Gulch Road (Area 3.1.a)	Agricultural	10.61
MU-017406 (SU-017405)	3rd Addition open space areas and pre-development areas in future Phases 4 and 6	Agricultural	86.2
MU-017407 (no associated soil management unit)	Phase 1 and Phase 2 common landscaping areas (Areas 3.1.e, 3.1.f, 3.2.a, 3.2.c, 3.2.f and 3.2.g)	Landscape Irrigation	1.29
MU-017408 (no associated soil management unit)	Phase 1, Phase 2, and 3rd Addition common landscaping and public gathering areas (Areas 3.1.b, 3.1.c, 3.1.d, 3.2.b, 3.2.d, 3.2.e, and 3.3.a through 3.3.g.)	Landscape Irrigation/Public Gathering Areas	13.91

HSSC's May 20, 2005 permit application submittal identifies revised reclaimed wastewater reuse areas and acreage reflecting as-constructed conditions. The revised hydraulic management unit (HMU) descriptions and acreage values are summarized in the following table. Changes appear in ***bold italics***.

Serial #	Revised Hydraulic Management Unit (HMU) Description	Type of Use	Revised Acres

MU-017401 (SU-017401)	Orchard along Seaman's Gulch Road: ***storm drain and road areas excluded from acreage*** (Area 3.1.a)	Agricultural	***9.54***
MU-017406 (SU-017405)	3rd ***and 4th*** Addition open space areas and pre-development areas in future Phase 6: ***delineated wetlands excluded from acreage***	Agricultural	***65.4***
MU-017407 (no associated soil management unit)	Phase 1, Phase 2, ***3rd Addition, and 4th Addition*** common landscaping areas (Areas ***3.1.d***, 3.1.e, 3.1.f, 3.2.a, 3.2.c, 3.2.f, 3.2.g, ***3.2.h, 3.3.b, 3.3.e, 3.3.f, 3.3.h – 3.3.o, 3.4.f – 3.4.l, 3.4.n–3.4.q, and 3.4.w – 3.4.z***)	Landscape Irrigation	***11.11***
MU-017408 (no associated soil management unit)	Phase 1, Phase 2, 3rd Addition***, and 4th Addition*** public gathering areas (Areas 3.1.b, 3.1.c, ***3.1.g***, 3.2.b, 3.2.d, 3.2.e, ***3.3.c, 3.3.d,*** 3.3.g, ***3.4.a – 3.4.e, 3.4.m, 3.4.r – 3.4.v***) ***and school grounds***	Public Gathering Areas	***19.46***
TOTAL			***105.51***

The permit renewal application describes that the 4th addition (Phase 4) completes development on the south side of Dry Creek. Modified land application areas on the north side of Dry Creek may be proposed in the future as Hidden Springs plans for development in that area.

Summary of Events

Wastewater land application permit LA-000174-01 was issued on April 20, 2000 and permit modification Appendix "B" was issued on October 30, 2003. The permit expiration date is April 21, 2005. HSSC submitted their permit renewal application on October 14, 2004. DEQ and CLPE visited the Hidden Springs site on January 13, 2005. A March 14, 2005 letter from DEQ administratively extended HSSC's existing permit until the renewal permit is issued. Additional permit application materials were requested by DEQ on March 21, 2005. HSSC submitted the requested information on May 20, 2005.

Site Characteristics

Site Management History

Prior to the Hidden Springs development, the 1,700 acre parcel was a combination of undeveloped land and agricultural land. The farm area was historically irrigated by surface flooding through diversion ditches from Dry Creek. As of October 2004, approximately 700 residents were living at Hidden Springs and the average flow to the wastewater treatment facility was 34,711 gpd (approximately 50 gpd/capita).

As described in HSSC's May 20, 2005 permit application submittal, areas north of Dry Creek in MU-017406 have never been irrigated with reclaimed wastewater. In 2002 and 2003, areas north of Dry Creek were used to grow alfalfa and were flood irrigated with fresh water from Dry Creek. In 2004, the area was not irrigated, yet, the alfalfa was harvested to maintain weed control. In 2005, HSSC plans to manage the area for weed control through disking.

Soils

HSSC's original land application permit application included soil characteristics based on field exploration and the Agricultural Soil Conservation Service (ASCS) soil classification system. Soils

adjacent to Dry Creek in MU-017406 were included in this analysis. Soils further from Dry Creek in MU-017401, 07, 08 and those proposed for the 4th addition development were not included.

Soils in MU-017406, northeast of Dry Creek are generally classified as sandy loams and loams. A portion of MU-017406 northeast of Dry Creek (within LAANE) has a soil complex associated with wetlands. HSSC's original application states that this area is not anticipated to be used for crop production. Soils in MU-017406, southeast of Dry Creek (within LAANW and LAASC) are generally characterized as sandy clay loam soils. Soils in MU-017406, southeast of Dry Creek (within LAASW) are generally characterized as loam soils.

Soil monitoring in LA-000174-01 is required for the agricultural areas only (MU-017401/SU-017401 and MU-017406/SU-017405) at the following frequency: Twice per year (in the spring prior to crop growth and in the fall after crop harvest); in the first year of land application and every other year thereafter. Required monitoring parameters are electrical conductivity, plant available phosphorus, ammonia-nitrogen, and nitrate nitrogen. HSSC performed soil monitoring in 2004 for all areas that were utilized for land application, not just the agricultural areas. Results of this monitoring effort are presented in the table below.

Hidden Springs Sewer Company Soil Monitoring Results

Serial Number	Sample Description	Sample Date	Sample Depth	Nitrate-Nitrogen, ppm	Ammonia-Nitrogen, ppm	Plant Available Phosphorus, ppm	Electrical Conductivity, umhos
MU-017401, SU-017401	3.1.a	3/29/04	0"-12" 12"-24"	0.36 0.84	7.91 7.81	6.8 7.4	836 1,220
		11/8/04	0"-12" 12"-24"	< 0.2 < 0.2	3.55 3.04	30.5 26.6	770 1,660
MU-017406, SU-017405	Organic Garden, East	6/23/04	0"-12" 12"-24"	44.4 9.3	4.38 2.92	35.8 11.6	397 151
		11/8/04	0"-12" 12"-24"	36.8 44	9.24 6.01	56.2 32.8	415 465
	Organic Garden, West	6/23/04	0"-12" 12"-24"	25.9 9.8	2.36 2.12	23.6 13.3	272 131
		11/8/04	0"-12" 12"-24"	39 26	6.97 1.8	34.1 26.0	429 352
	3.3.a	6/14/04	0"-12" 12"-24"	4.1 4.8	1.04 0.75	4.5 3.6	2,300 2,280
		11/8/04	0"-12" 12"-24"	2.6 2.3	< 0.50 0.51	5.0 < 5.0	1,360 1,270
MU-017407	3.1.d	3/29/04	0"-12" 12"-24"	0.66 0.74	7.43 6.23	13.4 5.6	257 275
		11/8/04	0"-12" 12"-24"	1.0 0.5	3.21 6.79	< 5.0 12.5	775 1,310
	3.1.e	3/29/04	0"-12" 12"-24"	0.87 0.92	6.18 6.34	16.6 10.2	414 439
		11/8/04	0"-12" 12"-24"	< 0.2 < 0.2	2.12 3.74	22.5 21.8	415 399
MU-017407 (Cont.)	3.1.f	3/29/04	0"-12" 12"-24"	5.07 4.67	9.11 13.7	88.2 80.4	398 385
		11/8/04	0"-12" 12"-24"	3.0 0.1	3.85 4.46	33.2 8.6	414 445

Serial Number	Sample Description	Sample Date	Sample Depth	Nitrate-Nitrogen, ppm	Ammonia-Nitrogen, ppm	Plant Available Phosphorus, ppm	Electrical Conductivity, umhos
	3.2.a	6/14/04	0”-12” 12”-24”	1.7 0.2	6.61 4.87	32.5 25.1	430 536
		11/8/04	0”-12” 12”-24”	< 0.2 < 0.2	3.04 5.03	18.4 31.0	659 641
	3.2.c	6/14/04	0”-12” 12”-24”	1.4 2.3	4.87 4.22	32.9 31.0	459 472
		11/8/04	0”-12” 12”-24”	< 0.2 0.9	5.27 3.87	49.6 21.4	520 476
	3.2.f	6/14/04	0”-12” 12”-24”	2.4 2.5	3.89 3.79	25.4 34.0	342 339
		11/8/04	0”-12” 12”-24”	1.5 1.0	4.68 5.36	40.0 23.2	449 472
	3.2.g	6/14/04	0”-12” 12”-24”	1.6 0.9	6.21 1.04	34.2 7.6	373 267
		11/8/04	0”-12” 12”-24”	0.9 0.7	5.44 5.81	31.4 9.0	358 239
	3.3.b	6/14/04	0”-12” 12”-24”	5.3 5.8	3.51 0.65	6.5 8.7	2,070 1,270
		11/8/04	0”-12” 12”-24”	4.2 4.9	26.5 23.0	54.8 10.8	510 437
	3.3.e	6/14/04	0”-12” 12”-24”	0.6 1.3	3.72 4.31	8.1 10.3	260 1,320
		11/8/04	0”-12” 12”-24”	2.5 1.7	4.60 4.77	58.8 11.8	883 1,090
	3.3.f	6/14/04	0”-12” 12”-24”	1.5 2.1	9.78 7.76	41.5 7.6	464 661
		11/8/04	0”-12” 12”-24”	0.9 0.5	2.01 3.18	33.8 < 5.0	409 624
MU-017408	3.1.b	3/29/04	0”-12” 12”-24”	2.58 0.69	7.78 8.94	27.8 5.4	1,300 2,010
		11/8/04	0”-12” 12”-24”	3.0 0.5	5.46 3.51	60.6 9.0	1,380 1,970
	3.1.c	3/29/04	0”-12” 12”-24”	13.2 13.1	9.16 6.97	419 118	901 1,920
		11/8/04	0”-12” 12”-24”	10 29	5.86 3.55	54.8 5.0	337 1,080
	3.1.g	3/29/04	0”-12” 12”-24”	2.08 1.45	6.22 4.91	16.6 22.0	219 309
		11/8/04	0”-12” 12”-24”	3.4 1.2	4.79 2.87	27.8 12.0	395 341
	3.2.b	6/14/04	0”-12” 12”-24”	0.4 1.0	6.8 5.84	33.0 25.3	527 496
		11/8/04	0”-12” 12”-24”	1.3 0.3	4.28 3.13	33.4 7.2	627 522
	3.2.d	6/14/04	0”-12” 12”-24”	7.9 2.5	8.46 36.0	33.3 35.8	460 256
MU-017408 (cont.)		11/8/04	0”-12” 12”-24”	3.2 0.9	8.12 17.1	38.8 28.2	441 465
	3.2.e	6/14/04	0”-12” 12”-24”	3.0 1.5	5.07 5.49	23.8 32.9	496 1,480

Serial Number	Sample Description	Sample Date	Sample Depth	Nitrate-Nitrogen, ppm	Ammonia-Nitrogen, ppm	Plant Available Phosphorus, ppm	Electrical Conductivity, umhos
		11/8/04	0”-12”	0.7	4.39	32.0	582
			12”-24”	4.0	7.17	22.8	1,190
	3.3.c	6/14/04	0”-12”	7.9	8.04	32.1	564
			12”-24”	3.7	7.10	18.0	1,360
		11/8/04	0”-12”	< 0.2	1.24	<5.0	428
			12”-24”	1.1	3.19	6.8	915
	3.3.d	6/14/04	0”-12”	13.5	7.58	36.6	581
			12”-24”	4.1	5.77	6.9	1,020
		11/8/04	0”-12”	5.1	38.6	54.8	619
			12”-24”	2.0	22.7	29.4	621
	3.3.g	6/14/04	0”-12”	43.4	5.98	29.9	631
			12”-24”	43.2	5.92	33.5	643
		11/8/04	0”-12”	3.3	4.10	8.6	937
			12”-24”	2.4	< 0.50	7.0	882

Nitrates: Soil monitoring in MU-017406 as part of the original permit application shows soil nitrate levels ranging from 1.25 to 5.01 ppm.

Results of 2004 soil monitoring show high and very high nitrate concentration levels in the organic garden (MU-017406/SU-017405). Also, very high nitrate levels were measured in area 3.3.g, a “pocket park” along West Eastpark Drive in MU-017408. Fertilizer use in reclaimed wastewater reuse areas is likely contributing to these high measured nitrate levels.

Soil nitrate concentrations are considered very low from 0-5 ppm, low from 6-10 ppm, medium from 11-25 ppm, high from 26-40 ppm, and very high above 40 ppm.

Phosphorus: Soil monitoring performed as part of the original permit application included analysis of soil samples for total phosphorus, instead of plant available phosphorus. Therefore, results from the original permit application cannot be compared to 2004 results.

For the orchard (MU-017401/SU-017401) high levels of phosphorus were measured in the fall. High and very high phosphorus levels were measured in the organic garden (MU-017406/SU-017405). Also, high and very high phosphorus levels were measured in the majority of areas in MU-017407 and MU-017408 (3.1.b, 3.1.c, 3.1.f, 3.1.g, 3.2.a – 3.2g, and 3.3.b – 3.3.g). Fertilizer use in reclaimed wastewater reuse areas is likely contributing to these high measured phosphorus levels.

Soil phosphorus concentrations are considered very low from 1-4 ppm, low from 5-11 ppm, medium from 12-25 ppm, high from 26-45 ppm and very high from 45 ppm and above.

Electrical Conductivity - Soluble Salts: As part of the 2004 soil monitoring, conductivity levels above 2,000 umhos were measured in areas 3.1.b, 3.3.a, and 3.3.b.

Measured electrical conductivity levels below 2,000 umhos/cm are considered to have negligible effects on crops. Values between 2,000 and 4,000 umhos/cm may restrict the yields of sensitive crops.
Staff recommends annual (March) soil monitoring of the agricultural reuse areas at depths of 0 to 1 and 1 to 2 feet for the following parameters: Electrical Conductivity, Nitrate-N, Ammonium-N, and Plant Available Phosphorus. The soil monitoring results should be used by HSSC to assess the need (or not) for supplemental fertilizer use in the agricultural reuse areas.

Surface Water
Figure 1 in HSSC's renewal permit application shows the location of key site features including Dry Creek, other creeks, delineated wetlands, springs, and 100 year floodplain areas.

MU-017406 is comprised of large block open space and predevelopment areas. The majority of area LAANNW in MU-017406 lies within the 100 year floodplain. Area LAANE contains areas of 100 year floodplain and delineated wetlands. Area LAASC contains delineated wetlands and springs.

Under permit LA-000174-01, 86.2 acres were associated with hydraulic management unit MU-017406. As clarified in HSSC's May 20, 2005 permit application submittal, the acreage for MU-017406 unit has been reduced to 65.4 acres. This reflects removing delineated wetlands and domestic well buffer zone areas from the hydraulic management unit.

Groundwater
HSSC's original permit application provides this description of groundwater in the Dry Creek area of Hidden Springs: "In the Dry Creek area, several different aquifers are known to exist. Throughout the valley bottom, an unconfined, shallow aquifer is found within the alluvium. Groundwater is very shallow and is generally less than 10 feet below ground surface (bgs). This shallow, water bearing unit is reportedly used for both irrigation and limited domestic purposes." The original permit application further identifies the minimum depth to groundwater in the valley floor south of Dry Creek to generally range from less than one foot to more than ten feet bgs.

The area's principal water supply aquifer is contained within higher permeability sand units. In wells completed within the deeper aquifer, static water levels range from 40 to 184 feet bgs. The primary direction of groundwater flow in the Dry Creek shallow water bearing unit is down valley (northwest).

As part of the original permit application, groundwater samples for initial site characterization were collected from six monitoring wells in MU-017406 (Wells 101 – 106). The historic usage of the land for agriculture and grazing is reflected in the groundwater results. The highest nitrate concentrations (6.23 and 10.1 mg/L) were measured on the north side of Dry Creek. TDS levels ranged from 203 to 533 mg/L. Total coliform levels of up to 1,000 were measured.

As described in HSSC's May 20, 2005 permit application submittal, the six monitoring wells are no longer in use. In May 2005, HSSC was able to locate Wells 101 and 106; both appeared on the surface to be in good condition. HSSC could not locate wells 102 and 103; they may have been removed. Wells 104 and 105 appeared, from a distance, to still exist. The area containing Wells 104 and 105 was inaccessible, so verification of the condition of the wells was not possible.

Groundwater monitoring is not required in LA-000174-01. **Staff recommends that this be continued in the renewal permit.**

Projected Wastewater Quality and Loading Rates

Wastewater Quantity
HSSC's wastewater treatment plant has an average design flow basis of 145,000 gpd. The Hidden Springs master plan includes a second wastewater treatment plant of equal capacity, to be built if additional capacity is needed. Monthly average wastewater influent flows reported in HSSC's 2004 annual report are summarized in the table below. The average influent flow shows an increasing trend over the 12-month period, as the Hidden Springs development continues to grow. HSSC's treatment

plant is not yet near capacity.

Monthly Average Wastewater Influent Flow

Month	Average Influent Flow, gpd
Nov – 2003	19,664
Dec – 2003	20,035
Jan – 2004	22,941
Feb – 2004	24,968
Mar – 2004	23,813
Apr – 2004	25,729
May – 2004	26,491
Jun – 2004	22,263
Jul – 2004	19,732
Aug – 2004	25,768
Sep – 2004	28,961
Oct – 2004	34,711
Total Annual Influent Flow, gallons	9,000,800

Measured total flows of applied reclaimed wastewater and applied potable water, as presented in HSSC's 2004 annual report, are presented in the table below.

2004 Measured Flows of Applied Reclaimed Wastewater and Potable Water

Area	Measured Flow, gallons
Total flow of applied reclaimed wastewater	7,881,610
Irrigation of Orchard (MU-017401):	
• Reclaimed Wastewater	2,124,400
• Potable Water	979,300
• Combined (Wastewater and Potable)	3,103,700
Irrigation of One-Acre Farm (part of MU-017406):	
• Reclaimed Wastewater	469,100
• Potable Water	61,400
• Combined (Wastewater and Potable)	530,500
Irrigation of School Grounds (part of MU-017408):	
• Reclaimed Wastewater	237,490
• Potable Water	710,450
• Combined (Wastewater and Potable)	947,940

The amount of reclaimed wastewater applied to the remaining land application acres in 2004 (part of MU-017406, all of MU-017407, and part of MU-017408) is determined by difference to be 5,050,620 gallons (7,881,610 – 2,124,400 – 469,100 – 237,490).

Wastewater Quality

Wastewater quality monitoring required in permit LA-000174-01 includes the following:

Monitoring Point	Frequency	Description	Parameters
Treatment Cell Influent	Monthly	Composite sample	TSS, BOD_5
Treatment Cell	Monthly	Grab sample	TSS, BOD_5

Effluent			
Filtration System Effluent	Continuous	Turbidity Analyzer	Nephelometric Turbidity Units
Filtration System Effluent	3 times per week	Composite sample	Total Suspended Solids
Reclaimed Wastewater	Daily	Grab sample	Chlorine Residual
Reclaimed Wastewater	3 times per week (Note 1)	Grab sample	Total Coliform
Reclaimed Wastewater	Monthly	Grab sample	COD, TKN, NO3-N, Total P, TDS, VDS

1. The frequency of Total Coliform monitoring of the reclaimed wastewater was reduced from "daily" to "3 times per week" per an August 12, 2002 letter from DEQ to Hidden Springs.

Results of monthly monitoring of the reclaimed wastewater for 2003 and 2004 are presented below. The average of 2003 and 2004 data is used in this staff analysis to evaluate constituent loading rates for Hidden Springs.

Constituent	**July 2003**	**August 2003**	**July 2004**	**August 2004**	**September 2004**	**October 2004**	**Average**
COD, mg/L	40.7	42.2	34.7	35.7	35.1	35.4	37.3
TKN, mg/L	3.92	2.88	1.73	1.49	2.04	2.19	2.38
Nitrate-N, mg/L	0.27	0.29	1.4	1	2	2.5	1.24
Total Nitrogen, mg/L	4.19	3.17	3.13	2.49	4.04	4.69	3.62
Total Phosphate as P, mg/L	2.52	2.23	1.67	1.1	3.45	4.02	2.50
Total Dissolved Solids, mg/L	510	542	580	548	650	490	553
Volatile Dissolved Solids, mg/L	88	78	56	42	514	160	156
Non-Volatile Dissolved Solids, mg/L	422	464	524	506	136	330	397

Projected Permit Limits, Hydraulic Loading Rates

The application season for the Hidden Springs project is from March 1 to November 30 (275 days).

The following equation calculates the growing season hydraulic loading rate for a given crop:
$IWR = [Cu - (PPT_e + \text{carry over soil moisture}) + LR]/E_i$.

IWR is the irrigation water requirement or the hydraulic loading rate for the growing season
Cu is the crop consumptive use
PPT_e is the effective precipitation
LR is the leaching rate
E_i is the irrigation efficiency

For permit purposes, the soil carry over moisture and leaching rate are assumed to be zero in calculating the IWR. The IWRs for pasture (grass), an orchard, and vegetables grown in the Hidden Springs area are

summarized in the table below. Irrigation efficiencies of 80% are assumed for the pasture and orchard areas; an efficiency of 90% is assumed for the vegetables, which are irrigated at Hidden Springs using a drip irrigation system**.**

CROP	CU (in.)	PPT_e (in.)	E_i (%)	IWR (ac-in/ac)	IWR (MG/ac)
Pasture	39.5	4.6	80%	43.7	1.19
Orchard	37.5	3.9	80%	42.0	1.14
Vegetables	25.5	1.9	90%	26.2	0.71

Orchard: The revised acreage for MU-017401, excluding the roadway and a storm water drainage area, is 9.54 acres. The combined metered volume of water applied to MU-017401 (reclaimed wastewater and supplemental irrigation water) in 2004 is 3.1 MG. As presented above, the IWR for an orchard is 1.14 MG/ac. This corresponds to an irrigated area of approximately 3 acres.

Vegetable Garden: In 2004, Hidden Springs maintained a one-acre vegetable garden on MU-017406. The combined metered volume of water applied to the one-acre garden (reclaimed wastewater and supplemental irrigation water) in 2004 is 0.53 gallons. This application volume corresponds well to the IWR for vegetables, 0.71 MG/ac.

School Grounds: The combined metered volume of water applied to the school grounds (reclaimed wastewater and supplemental irrigation water) in 2004 is 0.95 MG. As presented above, the IWR for pasture (grass) is 1.19 MG/ac. This corresponds to an irrigated area of approximately 1 acre. During 2004, Hidden Springs constructed a new school adjacent to the school grounds. This shortened the irrigation season for the school grounds, as reflected in the low irrigation rate for 2004. As presented in HSSC's May 20, 2005 permit application submittal, the reclaimed wastewater reuse area for the Hidden Spring's school is 8.24 acres. This acreage is part of MU-017408.

Remaining Land Application: The amount of reclaimed wastewater applied to the remaining land application acres (part of MU-017406, all of MU-017407, and part of MU-017408) in 2004 is approximately 5 MG. As presented above, the IWR for pasture (grass) is 1.19 MG/ac. This corresponds to an area of approximately 4 acres, assuming reclaimed wastewater only is utilized for irrigation. Thus, Hidden Springs has adequate permitted land application acreage to handle the current volume of generated reclaimed wastewater.

Capacity of Wastewater Treatment System: The HSSC wastewater treatment system has a design average daily flow basis of 145,000 gpd or 52.9 MGA (million gallons annually). As presented in the original permit application, this results in approximately 52.7 MGA available for reuse, when accounting for evaporation and precipitation at the storage reservoir. Based on irrigating grass with 52.7 MG of reclaimed wastewater, approximately 44 acres would be required for growing season only land application. **As future phases of Hidden Springs are developed, Hidden Springs must continue to designate adequate amounts of acreage for land application activities, to handle the amount of generated reclaimed wastewater.**

LA-000174-01 includes hydraulic loading rate permit limits for the agricultural areas only. Staff recommends that this be continued in the renewal permit. **Staff also recommends that the renewal permit include reporting requirements for HSSC to clearly identify, on an annual basis, those areas**

utilized for reclaimed wastewater reuse.

Projected Permit Limits, Constituents

Based on land application of the reclaimed wastewater with 3.62 mg/L total nitrogen, 2.50 mg/L phosphorus, 37.3 mg/L COD, and 397 mg/L NVDS, the projected constituent loading rates for various land uses and acreages are shown below.

Land Use	Acres	Reclaimed Wastewater, MG	Nitrogen, lb/ac/yr	Phosphorus, lb/ac/yr	COD, lb/ac/day	NVDS, lb/ac/yr
Orchard	9.54 3	2.1 2.1	6.65 21.1	4.59 14.6	0.25 0.79	729 2,319
Vegetable Garden	1	0.47	14.2	9.81	0.53	1,557
School Grounds	8.24 1	0.24 0.24	0.88 7.25	0.61 5.01	0.03 0.27	96 795
Minimum Future Land Application Area, Treatment Plant at Capacity, no Supplemental Irrigation Water	44	52.7	36.2	25.0	1.36	3,968

Nitrogen and Phosphorus: Low projected nitrogen and phosphorus loading rates are observed in the table above for the Orchard, Vegetable Garden, and School Grounds scenarios.

For the potential future scenario of 44 acres irrigated with 52.7 MG of reclaimed wastewater (assuming no supplemental irrigation water), a low nitrogen loading rate of 36.2 lb/ac-yr is observed and a phosphorus loading rate of 25.0 lb/ac-yr is estimated. Approximate nitrogen and phosphorus requirements for established lawn where clippings are removed are 132 lb nitrogen/acre-year and 19 lb phosphorus/acre-year. Thus, the continued use of supplemental irrigation water will assist HSSC in managing phosphorus application rates in areas with lawn.

Due to these low projected loading rates, staff recommends that the renewal permit not include nutrient loading rate permit limits.

Organics: Low projected COD loading rates are observed for all scenarios presented in the table above. WLAP permits typically include a COD permit loading rate limit of 50 pounds/acre-day during the growing season. **Due to the low projected COD loading rates, staff recommends that the renewal permit not include a COD loading rate permit limit. In addition, staff recommends not requiring HSSC to monitor COD concentrations in the reclaimed wastewater.**
NVDS: NVDS loading rates presented in the table above are based on a NVDS concentration in the wastewater of 397 mg/L (average of 2003 and 2004 monthly monitoring of reclaimed wastewater). The corresponding reclaimed wastewater TDS concentration is 553 mg/L. The Idaho DEQ Groundwater Quality Rule identifies a numerical standard for TDS in groundwater of 500 mg/L. **Staff recommends continued monitoring of the reclaimed wastewater for TDS and NVDS.**

Disinfection and Buffer Zones

LA-000174-01 includes a total coliform bacteria disinfection requirement of 2.2 organisms per 100 mL. The permit also includes a reclaimed wastewater total chlorine residual permit condition of 0.5 mg/L. Grab samples of reclaimed wastewater collected near the primary lift station are monitored three times per week for total coliform and daily for total chlorine residual.

The recently adopted modifications to the Wastewater-Land Application Permit Rules identify requirements for Class B effluent—"municipal reclaimed wastewater…used to irrigate golf courses, parks, playgrounds, schoolyards and other areas where children are more likely to have access or exposure." Requirements for Class B effluent include a residual chlorine level of not less than 1 mg/L free chlorine.

In 2004, daily total chlorine residual measurements ranged from 0.46 to 5.50 mg/L. During 2004, measured total coliform levels were less than 1 organism per 100 mL, except during one week in September (measurement of 8 organisms per 100 mL). Thus, HSSC has been very successful in meeting the 2.2 organisms per 100 mL disinfection requirement.

Staff recommends that a total coliform requirement of 2.2 organisms per 100 mL and a residual chlorine level of not less than 0.5 mg/L free chlorine be included in HSSC's renewal permit. Staff recommends that the monitoring frequencies remain as three times per week for total coliform and daily for residual chlorine.

In LA-000174-01, the minimum distances between buffer objects and areas of land application are as follows:

- Domestic Water Wells: 100 feet
- Irrigation Water Wells: 100 feet
- Municipal Water Wells: 100 feet (or meet Federal Safe Drinking Water Act requirements)
- Inhabited Dwellings: 0 feet
- Surface Water (natural or man-made): 0 feet (mitigation measures to prevent runoff into surface waters shall be employed)
- Areas of Public Access: 0 feet

Site Management

Posting requirements in LA-000174-01 are: "Reuse locations where frequent public access will occur shall be posted in a manner that identifies these areas are using reclaimed water for irrigation." **Staff recommends that posting requirements apply to all areas using reclaimed wastewater, due to the residential nature of the entire Hidden Springs development.**

Staff recommends that irrigation scheduling during periods of limited or restricted use be expanded to cover "Landscape Irrigation" as well as "Public Gathering Areas" due to the proximity of residences to many of these areas. Staff recommends that a reporting requirement be added to the annual report, documenting the irrigation control setting for areas using reclaimed wastewater, three times during the irrigation season (near the beginning, middle, and end of the season). No restrictions on irrigation scheduling are recommended for "Open Space/Agricultural Areas."

In summary, staff recommends the following items for site management:

1. Require HSSC to update their plan of operation.

2. Require HSSC to conduct seepage rate testing of Cell 1, Cell 2, and the storage lagoon.
3. Specify posting requirements for reuse areas and requirements to restrict access to the reclaimed wastewater.
4. Have HSSC identify, in each annual report, the reclaimed wastewater reuse areas utilized during that year.
5. Require HSSC to document the irrigation control settings for "Landscape Irrigation" and "Public Gathering Areas" using reclaimed wastewater, three times during the irrigation season. The documentation should identify the corresponding reuse area.
6. Require HSSC to submit plans, for DEQ review and approval, prior to putting a new or modified reuse area into service.

Recommendation

DEQ staff recommends issuance of the attached draft permit. The draft permit addresses disinfection requirements, hydraulic loading rates, and wastewater treatment plant performance. Monitoring and reporting requirements to evaluate system performance and to determine permit compliance have been specified. Compliance activities, as recommended in the staff analysis, are incorporated into Section E of the permit.